

**PRIVILEGED AND CONFIDENTIAL
ATTORNEYS' WORK PRODUCT**

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SUMMARY OF DATA ON COCOA

ABSTRACT. Cocoa is widely used as a casing material to enhance flavor and aroma and improve overall smoking quality of blended cigarettes. Cocoa and cocoa products are approved for use in tobacco in the United Kingdom at levels up to 5%, and in the Federal Republic of Germany.

Two independent mouse-skin painting studies have evaluated cocoa's effect when used as an ingredient upon the biological activity of cigarette smoke condensate. Although one study using two dose levels showed heightened tumorigenicity, the increases were statistically significant at only one level, and no increases were observed in the other study.

Animal studies have indicated that the toxic effects of cocoa are directly related to the theobromine content of cocoa. Cocoa is not mutagenic in the Salmonella typhimurium assay with or without activation.

Background. All forms of cocoa and chocolate are derived from cocoa beans, which are found in the seed pods of the Theobroma cacao L. tree which grows in the tropical belt regions. The major suppliers of cocoa are Ghana, the Ivory Coast, Nigeria, Cameroon, Brazil, Columbia, and Venezuela. In commerce, cacao refers to the tree and its natural products; cocoa describes the manufactured product used to make a beverage or powdered flavoring; and chocolate is the manufactured product in solid form (Heath, 1981).

Chemical changes which occur during fermentation, drying, roasting, and conching of the cacao beans eliminate most of the harsh volatiles, tannins, and other organic substances to produce dry, brittle beans which are easily

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